

## CLAIMS

1. A system for data transmission over an optical network, the system comprising:

5 a service collection unit including

a collection module for collecting a plurality of services data to be transmitted;

a processing module for processing the services in their original protocols into packets; and

10 a packet transmission module for converting the services into optical signals on an optical fiber for transmission into a metro network; and

an aggregator, coupled for upstream and downstream optical communication to a plurality of said service collection units, and including:

15 a sorting module for sorting the services from a plurality of packets according to service type; and

a service aggregation module for combining like services for transmission over an appropriate service network.

2. The system according to claim 1, wherein said packet transmission module includes a multiplexer/demultiplexer for multiplexing/demultiplexing like services onto an optical fiber in an appropriate network.

3. The system according to claim 1, wherein said service aggregation module includes a multiplexer/demultiplexer for multiplexing/demultiplexing like services onto an optical fiber in an appropriate network.

4. The system according to claim 1, wherein said service collection unit comprises:

at least one services interface;

a packetization module for receiving services from said interface and inserting the services into packets;

a tagging module for tagging said packets; and

a packet switch, coupled between said tagging module and a Trunk, for  
5 switching said packets to at least one service collection unit's optical transceiver.

5. The system according to claim 3, wherein the service collection unit's optical transceiver includes at least one wavelength specific laser, and further includes a wavelength division multiplexer/demultiplexer (WDM) for  
10 multiplexing/demultiplexing the number of optical transceivers with different optical signals (wavelengths) onto/from a single optical fiber.

6. The system according to claim 3, wherein said tagging module is a Multi-Protocol Label Switching (MPLS) tagging module for adding a tag based on  
15 MPLS to each of said packets.

7. The system according to claim 3, further comprising a module in said Trunk for encapsulating said tagged packets into Point-to-Point Protocol (PPP) packets.  
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8. The system according to claim 7, wherein said service collection unit further comprises a stream switch, coupled between the packet switch and the service collection unit's optical transceivers, for switching PPP packets between optical transceivers.  
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9. The system according to claim 7, wherein said PPP packets are arranged in an HDLC-like frame.

10. The system according to claim 4, wherein said service collection unit further comprises at least one transmission framer per stream for mapping said tagged packets onto transmission frames, coupled between the packet switch and the service collection unit's optical transceivers.

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11. The system according to claim 10, wherein said transmission framers are Packet over SONET/SDH (PoS) framers.

12. The system according to claim 10, wherein said service collection unit further comprises a stream switch coupled between said transmission framers and said transceivers for switching transmission frames between transceivers.

13. The system according to claim 10, wherein said service collection unit further comprises a stream switch, coupled between the transmission framers and the service collection unit's optical transceivers, for switching transmission frames between optical transceivers.

14. The system according to claim 3, wherein said aggregator unit, in an upstream mode, includes:

20 an aggregator optical transceiver,  
a packet switch serving as a sorting module, for directing packets from a trunk, received in said aggregator optical transceiver, according to destination;  
a tagging module for removing a tag from said packets; and  
a service aggregation module for aggregating like services, said  
25 aggregation module being coupled to an appropriate network using a designated protocol.

15. The system according to claim 14, further comprising:  
a framing module, coupled between said aggregator's optical  
30 transceiver and said packet switch, for removing packets from a transmission frame.

16. The system according to claim 14, wherein the service collection unit's optical transceiver includes at least one wavelength specific laser, and further includes a wavelength division multiplexer/demultiplexer (WDM) for multiplexing/ demultiplexing the number of optical transceivers with different optical signals (wavelengths) onto/from a single optical fiber.

17. The system according to claim 14, wherein said aggregator's tagging module is a Multi-Protocol Label Switching (MPLS) tagging module for adding a tag based on MPLS to each of said packets.

18. The system according to claim 1, wherein said aggregator, in a downstream mode, includes:

an aggregator's optical transceiver for receiving aggregated services in their original protocols;

a sorting module for de-multiplexing said received services;

a packet processing module for processing the services into packets in a frame, tagging, sorting and multiplexing according to destination; and

said service collection unit, in a downstream mode, includes:

a service collection unit's transceiver coupled for downstream optical communication to said aggregator's optical transceiver;

a de-packing module for de-packing the frames so as to retrieve a plurality of service packets;

a processing module for removing original services from said packets;

and

a transmission module for transmitting services according to destination.

19. The system according to claim 18, wherein said packet processing module further comprises a transmission framer for inserting processed packets into transmission frames; and

said transmission module is arranged to load said transmission frames onto an  
5 optical fiber.